Statement before the Joint Hearing of the Subcommittee on Commerce, Trade, and Consumer Protection and the Subcommittee on Communications, Technology, and the Internet

Driven to Distraction: Technological Devices and Vehicle Safety

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The Insurance Institute for Highway Safety is a nonprofit research and communications organization whose mission is to reduce the deaths, injuries, and property damage that occur on our nation's road. We are supported by automobile insurers. Thank you for the opportunity to share the results of our research on the risk of cellphone use while driving and the effect of state laws on restricting phone use while driving.

I am here to talk about an issue of mounting public concern, namely the danger posed by drivers distracted by dialing, talking, or texting on cellphones. The reason for the concern is accumulating evidence of risk to the public from distracted drivers. This evidence includes a number of well-publicized incidents when distraction contributed to disastrous crashes. We need to look at what we know and do not know about the problem and about solutions. The US public is not well served by rushing to propose solutions that may not work. Examining the evidence is critical to coming up with public health policies that will enhance safety.

Cellphone use while driving Is widespread

Surveys of US drivers indicate that many talk on cellphones. Observational surveys conducted by the National Highway Traffic Safety Administration (NHTSA) at intersections controlled by stop signs or stop lights indicate that at any given time during daylight hours in 2008, 6 percent of passenger vehicle drivers were talking on hand-held phones. This was double the rate observed in 2000, but use has not risen since 2005 (Glassbrenner, 2005; NHTSA, 2009; Utter, 2001). This means that more than 800,000 passenger vehicle drivers who were stopped at intersections at any given daylight moment in 2008 were talking on hand-held phones. The 2008 hand-held phone use rate among drivers estimated to be 16-24 years old was 8 percent, which was significantly higher than use rates among drivers estimated to be 25-69 (6 percent) or 70 and older (1 percent). The rate of visible headset cellphone use was about 1 percent, and the rate of visible manipulation of hand-held devices was 1 percent. Precise measurements of hands-free cellphone use cannot be obtained through observational surveys, but many drivers report using hands-free phones in telephone surveys (Boyle and Lampkin, 2008; Harris Interactive, 2006; Nationwide Insurance, 2008). Based on drivers' self-reported phone use combined with observed use rates, NHTSA estimated that 11 percent of drivers were using any kind of phone at any given daylight moment in 2008. The estimated rate of total phone use was up from 4 percent in 2000 but has been relatively steady since 2005 (Glassbrenner, 2005; NHTSA, 2009; Utter, 2001).

Risk associated with cellphone use while driving

A large body of research has addressed the risk of talking on a cellphone while driving (McCartt et al., 2006). It is important that studies of crash risk verify the phone use of crash-involved drivers independent of police crash reports or driver self-reports, which are unreliable sources of information. Two controlled epidemiologic studies used cellphone company billing records to verify crash-involved drivers' phone use. One observed that talking on a phone was associated with a 4-fold increase in the risk of a property-damage-only crash (Redelmeier and Tibshirani, 1997), and the other observed a 4-fold increase in the risk of a crash serious enough to injure the driver (McEvoy et al., 2005). The increase in crash risk did not differ significantly between male and female drivers or between drivers younger than 30 and those 30 and older. The increased risk was similar for hand-held and hands-free phones. The researchers were unable to estimate the crash risk associated with different types of hands-free devices, including fully hands-free systems. Nor were they able to determine whether it was safer to place a call with hands-free technology, such as voice dialing, than to dial manually. Both of these studies had excellent methods of controlling for factors that can influence crash risk other than cellphone use, such as risk-taking propensity. These 2 studies provide the strongest evidence that talking on a cellphone causes crashes.

Another epidemiologic study (Young and Schreiner, 2009) looked at airbag deployment crashes among drivers who subscribe to OnStar, an in-vehicle hands-free system for dialing and conversing. This study reported no increased risk of a crash resulting in an airbag deployment associated with OnStar use. In fact, it reported a 38 percent lower risk, albeit non-significant. Methodological issues limit the conclusions that can be drawn from this study. Nothing is known about other cellphone use during the comparison periods when drivers were not using OnStar. There was no control of potentially confounding factors such as driver age, driver gender, or time of day. Driving minutes during comparison periods were unknown and were estimated using data from other fleets, which could result in either overestimation or underestimation of true risk. Because of these problems, this study cannot definitively answer whether placing OnStar calls posed an increased risk. Equally important, this study does not negate the extensive scientific findings indicating risk from cellphone use while driving.

A review of more than 120 cellphone studies included experimental ones that found impairment in simulated or test-track driving performance measures among users of hand-held and hands-free cellphones (McCartt et al., 2006). Phone conversation tasks typically slowed reac-

tion times and increased lane deviations and steering wheel movements. Statistical analyses that aggregated the results of multiple studies reported similar findings (Caird et al., 2008; Horrey and Wickens, 2006). There are fewer experimental studies of the effects of dialing on performance measures, and the evidence is mixed as to whether hands-free dialing is less impairing than manual dialing (Jenness et al., 2002; McCartt et al., 2006; Schreiner, 2006).

Other evidence comes from "naturalistic" research involving drivers observed in their own vehicles that are outfitted with cameras and other technology. In a study of 100 vehicles monitored for about a year, cellphone use was a common source of driver distraction (Klauer et al., 2006). The odds of an at-fault near-crash or crash were 2.8 times as high when dialing a hand-held device than when hand-held phones were not used. When talking on a hand-held phone, the odds ratio was 1.3 times as high. This increase did not reach traditional levels of statistical significance, but when the amount of time spent conversing on a phone versus dialing was considered the percentages of near-crashes or crashes attributable to talking and dialing hand-held phones were equivalent (3.6 percent). This study has limitations that preclude it from giving definitive answers about the magnitude of crash risk associated with cellphone use and about whether hands-free dialing and conversation are safer than hand-held dialing and conversation. Ninety percent of the events were near-crashes, not crashes, and we do not know how strongly near-crashes are related to actual crashes. Another limitation was the small sample of volunteer drivers who were not necessarily representative of the general population of drivers. Still another limitation is that the statistical analyses did not do enough to control for other factors that influence the chances of involvement in crashes or near crashes. Specifically, the researchers did not compare individual drivers to their baseline driving patterns. Use of hands-free devices could not be determined and so was not a subject of this research, and it is unclear if drivers may have been talking on hands-free phones during comparison periods.

In summary, the cumulative evidence from epidemiologic studies, lab studies, test-track studies, and naturalistic research points to cellphone use as a risk factor for crashes and impaired driving performance. There are discrepancies among studies as to the magnitude of the increased risk, but there is little doubt that this is a traffic safety problem.

Risk of texting while driving

It is apparent that looking at a phone and manipulating it with both hands is inconsistent with safe driving. Yet a 2008 survey of drivers found that 40 percent of those 30 and younger who own cellphones said they send or read text messages while driving (Nationwide Insurance, 2008). There is not a lot of research on texting and driving, but 2 studies of young drivers found that receiving, and especially sending, text messages led to decrements in simulated driving performance, particularly lane keeping and reaction time (Hosking et al., 2006; Reed and Robbins, 2008). A naturalistic study reports a 23-fold increase in the risk of crashing, nearly crashing, conflicting with traffic, or drifting from the driving lane among truckers who texted while they drove. This study found a 6-fold increase in risk from dialing a hand-held cellphone and no increase in risk from talking on a hand-held phone (Hanowski et al., 2009; Olson et al., 2009). More than 95 percent of the incidents involved traffic conflicts or lane drifts, 4 percent were near-crashes, and less than 1 percent were crashes. It is unknown whether the findings can be generalized to drivers of passenger vehicles.

Laws restricting cellphone use and texting

A number of jurisdictions worldwide, including several US states, make it illegal to use a hand-held cellphone while driving. Seven states and the District of Columbia have such bans (Map A). More common in the United States are laws that restrict young drivers from using any type of cellphone (Map B) or restrict school bus drivers from using cellphones (Map C). Text messaging is banned for all drivers in 18 states and the District of Columbia (Map D). Young drivers are banned from texting in 9 states (Map D).

Evidence about the effects of these bans is mixed. The Insurance Institute for Highway Safety has studied driver response to 3 of the statewide bans on hand-held use (McCartt and Geary, 2004; McCartt and Hellinga, 2007; McCartt et al., 2009). In November 2001, New York became the first state to implement a ban on hand-held cellphones for drivers, and driver hand-held phone use immediately declined by an estimated 47 percent. Then use began going back up, but when measured more than 7 years after the ban it still was 24 percent lower than would have been expected without the ban. Soon after a ban was passed in the District of Columbia in 2004, driver hand-held phone use dropped 41 percent. Nearly 5 years after the ban, the rate of hand-held phone use was 43 percent lower than would have been expected with-

out a ban. Connecticut's ban took effect in 2005. Hand-held phone use immediately declined an estimated 76 percent, and more than 3 years later use was 65 percent lower than would have been expected without a ban.

The estimated effects of these 3 laws thus differ considerably, but the results indicate that banning hand-held phone use can have large and lasting effects. Another study, which looked at teen drivers after North Carolina banned their use of cellphones in 2006, indicated that age-focused laws in the absence of vigorous and visible enforcement may be much less effective. North Carolina's law banned the use of any telecommunications device by drivers younger than 18. About 11 percent of teenage drivers were observed using phones before this law, and the percentage rose slightly to 12 percent in the post-law survey. At comparison sites in South Carolina, which did not have similar restrictions, teen drivers' phone use remained steady at about 13 percent. This research may demonstrate the difficulty of curbing cellphone use when drivers realize the law is not being enforced. In post-law telephone surveys, only 22 percent of teenagers and 13 percent of parents believed the ban in North Carolina was being enforced fairly often or a lot (Foss et al., 2009).

The safety effects of statewide bans on hand-held phone use while driving are not clear. Many drivers still use hand-held phones where use is banned, and other drivers may simply switch to hands-free phones. Given that crash risk increases substantially when drivers talk on either kind of phone, banning hand-held phone use will not eliminate cellphone-related crashes for those who merely switch to hands-free. We also do not know how bans on hand-held phone use affect the total amount of time spent on the phone while driving. If people who switch to hands-free devices have more or longer conversations than when they were using hand-held phones, then the total time at risk of a distraction-related crash may increase. Laws limiting the use of all electronic communications devices by drivers may make the most sense based on the research, but such laws are difficult to enforce. Police officers can see whether a driver is holding a phone to the ear, but it is much harder to determine if a driver is sending a text message or talking on a hands-free phone.

Conducting studies of crashes following cellphone use bans could put an end to the speculation. As part of our ongoing research to understand the implications of cellphone bans, the Insurance Institute for Highway Safety and affiliated Highway Loss Data Institute have examined insurance collision claim frequencies for vehicles 1-4 years old. One interesting finding is that as driver use of cellphones has increased since 2000 the frequency of collision

claims (claims per 100 insured vehicle years) has declined (Figure 1). Apparently, the increased crash risk associated with cellphone use has not been sufficient to offset a general decline in collision claim frequency.

We also have examined rates of insurance claims in states with hand-held bans. Figure 2 shows the monthly frequency of collision claims per 100 insured vehicles per year in California during the 18 months before and the 12 months after a hand-held ban took effect in July 2008. This figure also shows claim frequencies for vehicles aggregated across the neighboring states of Arizona, Nevada, and Oregon. Although the claim rate varies considerably from month to month, no notable change is apparent in California's collision claim rate associated with the law. Month-to-month changes in the claim rate during the months leading up to and following the California ban appear very similar to patterns in the comparison states. The researchers produced similar charts for New York State and the District of Columbia around the time these jurisdictions established bans on hand-held phone use, and the charts tell a similar story: no reduction in collision claim risk coincident with the laws.

These analyses of insurance claims should be considered preliminary. They are simple descriptive statistics of crash claim risk over time. However, they raise questions about the potential effectiveness of hand-held cellphone bans in terms of the most important variable, the safety of our roads. They indicate a need to better understand the effects of cellphone use and phone use bans on crash risk.

Educational campaigns without enforcement will not work

The US experience with highway safety laws indicates that education alone will not change driver behavior. In general, the most effective strategy for changing driver behavior is strong laws that are vigorously and visibly enforced.

The US experience with safety belt use is instructive. The Insurance Institute for Highway Safety documented the low rate of belt use in the early 1970-80s. One study found that belt use averaged 12 percent across all regions of the United States in 1982 (Lund, 1986). To evaluate the effects of an education campaign motivating people to buckle up, the Institute conducted an intensive 9-month television advertising campaign in a community whose residents received television service from 1 of 2 different cable sources (Robertson et al., 1974). A variety of messages were broadcast on 1 of these cable stations, so some residents were ex-

posed to the messages and some were not. This campaign failed to produce an increase in belt use in neighborhoods where the ads were aired compared with other neighborhoods.

Research has shown that education must be combined with highly visible police enforcement of belt laws to bring about changes in behavior. Evaluation of a 5-year publicity and enforcement campaign across North Carolina found that belt use rose from the mid-60 percent range to 84 percent (Williams et al., 1996). This “Click It or Ticket" program became the model used throughout the United States to increase belt use.

New technology may help curb phone use while driving

A potential approach would use technology to control how and when motorists use their phones. Devices are in the works that would block phone use in moving vehicles, but a problem is that such devices would block phoning and texting by passengers as well as drivers. To get around this some systems include a passenger mode, but it is unclear whether drivers can be prevented from activating it to circumvent the whole purpose of the devices.

The main customers for such technology may be fleet managers seeking to control phone use by employees or parents who want to ensure their teenagers are not using cellphones while driving. However, phone blockers of any sort are not yet in widespread use, and their real-world effects are not known.

Crash avoidance technology may help

Driver error has long been the most frequent proximal cause of crashes, even before the advent of cellphones and other electronic distractions in vehicles (Treat et al., 1979). To prevent or mitigate some of these errors, automakers and their suppliers are introducing technology designed to alert drivers to imminent collisions or dangerous situations and, in some cases, to take action automatically to brake or correct vehicle course. Such technology may offer some protection against distractions from phone use, with the additional advantage that the technology would address errors that drivers make when the distractions come from other sources.

Remaining research questions

Before policymakers can make sound decisions about what countermeasures to adopt, we need better evidence on several key issues. We know that phone use while driving increases the risk of crashing. But there are discrepancies in the estimated size of the risk of phone use, and we need to understand these differences. The risk associated with various types of

hands-free phone, including fully hands-free devices, relative to other devices has not been established. The most serious deficit in our knowledge is that we do not know whether banning driver phone use reduces crash frequency. Before we encourage or require more states to enact bans, researchers should examine the effects of existing bans and whether they enhance traffic safety.

An important unknown is the number of crashes attributable to cellphone use. Has this number changed as driver phone use has increased? The only well-controlled studies that have verified phone use in a large sample of crash-involved drivers found that the risk of crashing was 4 times higher when a driver was using either a hands-free or hand-held phone. Observational studies show that cellphone use increased, at least during 2000-05, so we would expect to have seen a corresponding increase in the number of crashes. Yet police-reported crash frequencies in the United States have declined, in part because of the economic downturn and other factors. Whether increases in phone use have prevented larger declines is unknown. Perhaps the degree of elevated crash risk related to phone use differs among different types of drivers or in different driving situations (e.g., high-speed roads versus city driving) in ways that dampen the effects on total crashes.

A limitation of real-world studies of cellphone effects on crashes and safety-relevant events is that the reasons people are using phones may be related to the causes of crashes. This would inflate risk estimates. If drivers tended to make calls during low-risk traffic conditions, this would decrease the risk estimates. At this point we have no answers to these questions.

To understand the dimensions of the crash problem related to phone use we need better information about patterns of phone use in the United States, including the proportion of time drivers are dialing or talking on phones. We need to know whether total driver phone use goes up, goes down, or stays the same after a ban. Observational studies can determine when a driver is using a hand-held phone, but it is difficult if not impossible to determine whether a driver is using a hands-free phone. Technology to determine whether a cellphone is in use in moving vehicles would enable researchers to estimate the frequency of hands-free phone use. While technology has been developed to detect cellphone use in controlled environments such as prisons, it is unknown whether this technology could be used to monitor phone use in moving vehicles.

Finally, technology is available to prevent drivers from using their cellphones while driving. We need fleet studies to evaluate whether this technology will work in the real world.

The Insurance Institute for Highway Safety will continue to conduct research to understand apparent discrepancies in the findings of various studies. We will continue to seek answers to the key outstanding questions so that public policy will be based on sound evidence.

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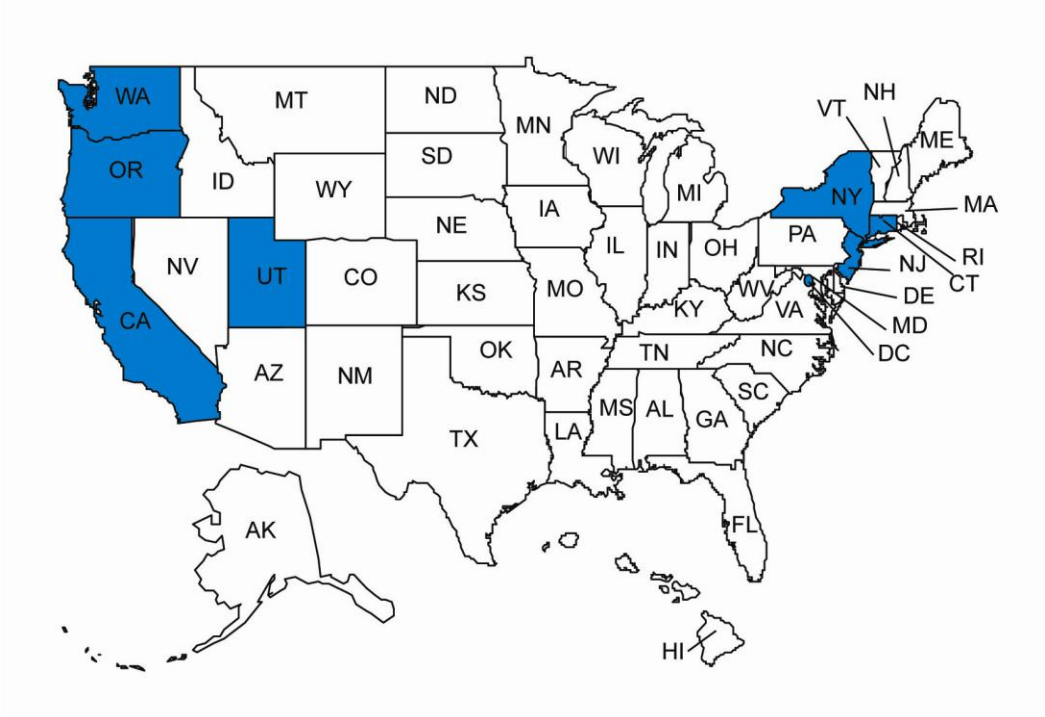
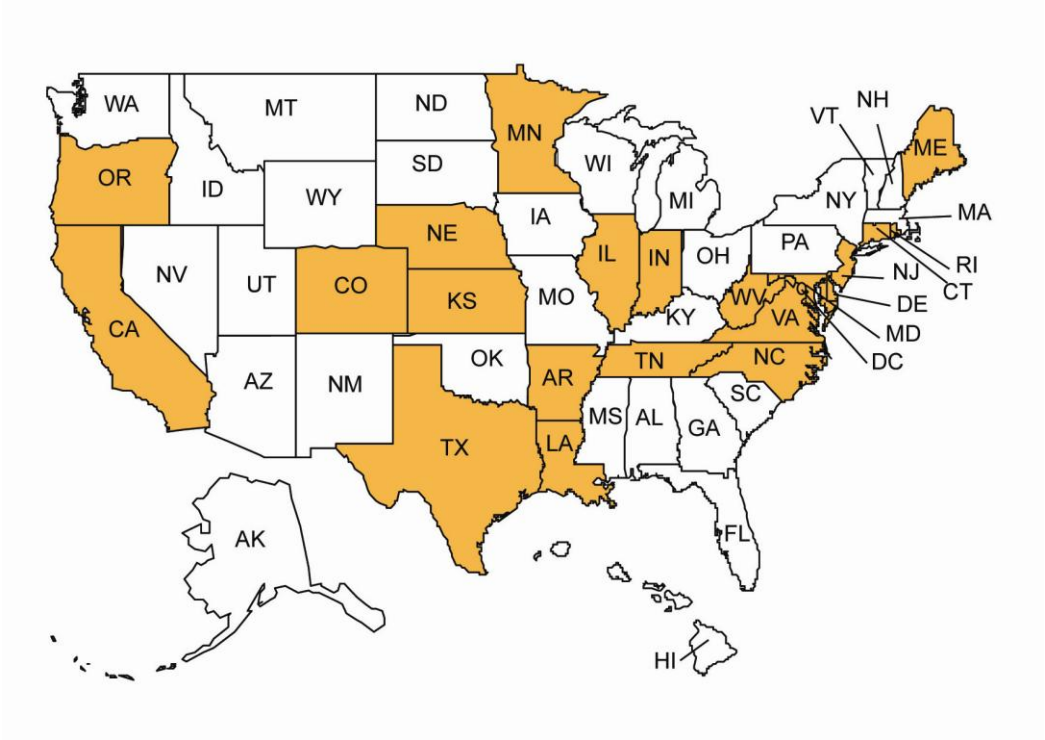
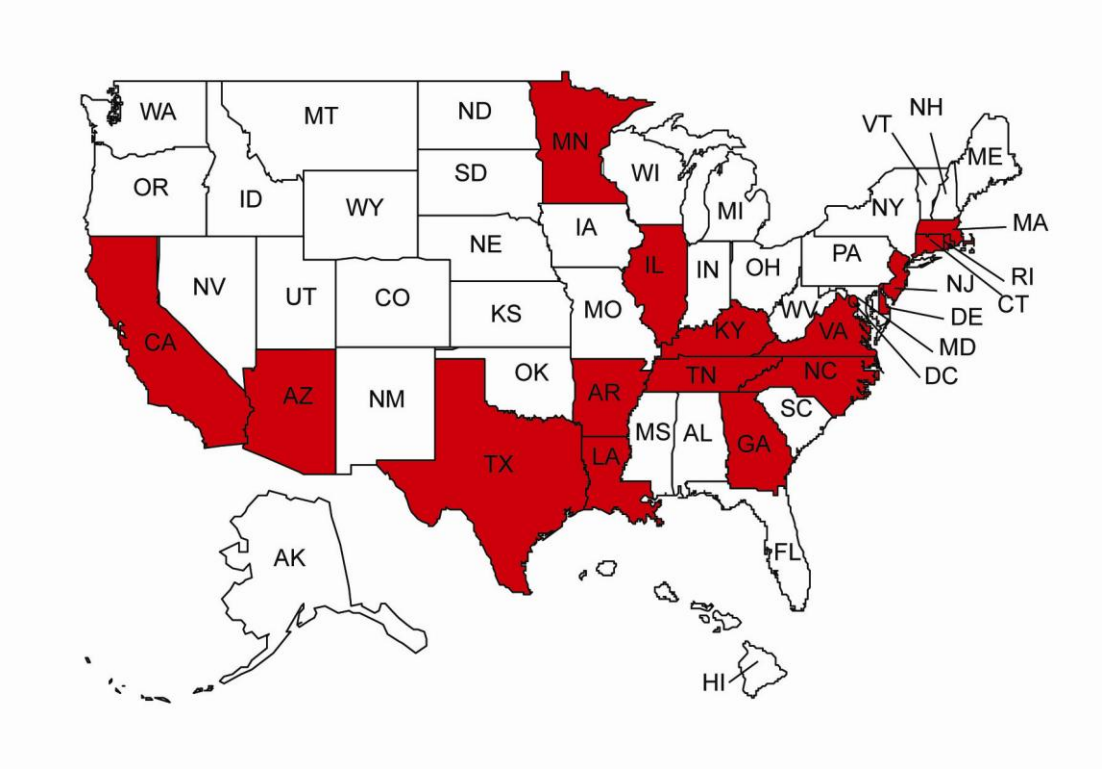
Map A
Statewide hand-held cellphone bans



Map B
Statewide teenage driver cellphone bans



Map C
Statewide school bus driver cellphone bans



Map D
Statewide texting bans

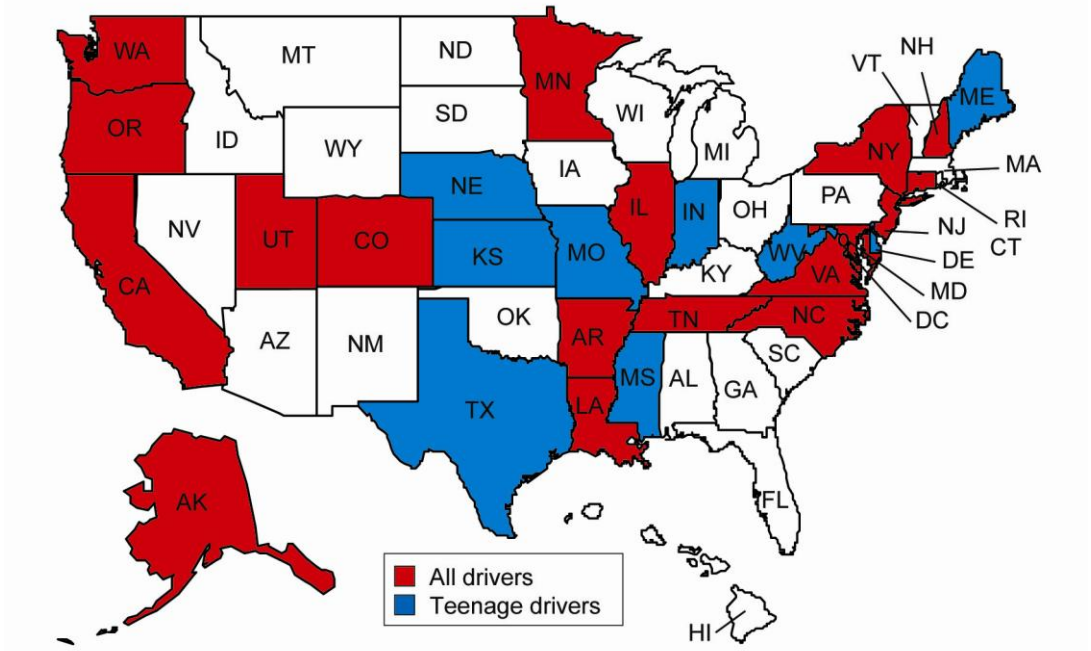


Figure 1
Collision claims per 100 insured vehicle years,
by calendar year, based on 4 most recent model years

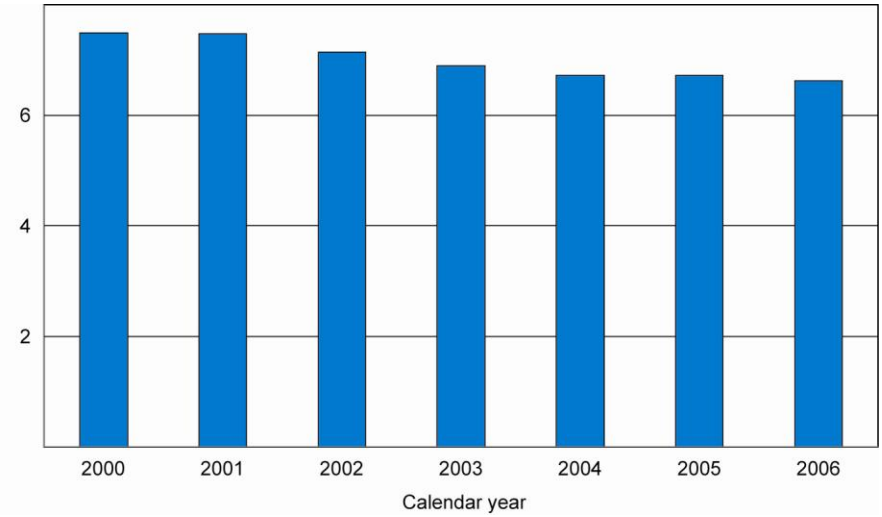


Figure 2
Claims per 100 insured vehicle years in California (with cellphone ban) versus Arizona, Nevada, and Oregon (without ban)